Magnetic resonance imaging of human embryonic stem cells.

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Authors: Jaehoon Chung, Mayumi Yamada, Phillip C Yang

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Public Summary:

Scientific Abstract:
Magnetic resonance imaging (MRI) may emerge as an ideal non-invasive imaging modality to monitor stem cell therapy in the failing heart. This imaging modality generates any arbitrary tomographic view at high spatial and temporal resolution with exquisite intrinsic tissue contrast. This capability enables robust evaluation of both the cardiac anatomy and function. Traditionally, superparamagnetic iron oxide nanoparticle (SPIO) has been widely used for cellular MRI due to SPIO's ability to enhance sensitivity of MRI by inducing remarkable hypointense, negative signal, "blooming effect" on T2*-weighted MRI acquisition. Recently, manganese chloride (MnCl(2)) has been reported by our laboratory for its ability as a contrast agent to track biological activity of viable cells. Hyperintense, positive signals can be achieved from the Mn(2+)-labeled stem cells on T1-weighted MRI acquisition. Cytotoxicity is a potential drawback of Mn(2+) labeling of the cells. However, in our laboratory the labeling method has been optimized to minimize cytotoxic effects. This article describes two different magnetic labeling methods of human embryonic stem cells (hESC) using SPIO and MnCl(2).

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